Introduction to the i.MX Applications Processor Portfolio

AMF-CON-T0678

Pat Stilwell
Product Marketing

August 2013

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i.MX

Your Interface to the World

i.MX families offer some of the most versatile platforms for multimedia and display applications, bringing personality and interactivity to a whole new world of products

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Auto

Smart Devices

Industrial

Medical

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Comprehensive Portfolio Based on ARM Technology

Kinetis
Microcontrollers

Design Potential. Realized.

The most scalable solutions of ultra-low power mixed-signal MCUs based on the ARM Cortex-M architectures in the industry.

- Consumer
- Industrial

Vybrid
Controller Solutions

New!

Rich Apps in Real Time

Real-time, highly integrated solutions with best-in-class 2D graphics to enable your system to control, interface, connect, secure and scale.

- Consumer
- Automotive
- Industrial

i.MX
Microprocessors

Your Interface to the World

Industry's most versatile solutions for multimedia and display applications, with multicore scalability and market-leading power, performance and integration.

- Consumer
- Automotive
- Industrial

Freescale gives you the market's widest range of ARM-based solutions for automotive, industrial, consumer and networking applications. Find your ideal solution at the price, performance and power level you desire and leverage the extensive software and tool bundles available to speed and ease your design process.

i.MX Value

Freescale is a trusted provider of high quality technical solutions that enable the development of breakthrough Smart Devices

Trusted Partner	Enablement	Technology Leadership
Freescale is on your team, delivering innovative products with long lives and the quality you expect from a leader.	**Freescale's ARM portfolio** has the technical infrastructure to provide the highest level of support in the IC industry	**Freescale's i.MX family includes a wide range of platforms** giving customers access to the necessary components for designing breakthrough embedded systems
Embedded Leadership	Development Platforms	Broad Portfolio
Long Product Lives	Vast Ecosystem	Power & Performance Leadership
Quality	Software Completeness	Scalable Platforms
Service	Ease of Use	Targeted Reference Designs

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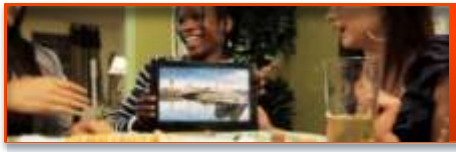
i.MX Markets and Applications

Automotive

- Infotainment
- Telematics
- Instrument Clusters
- Vision/Camera Systems

eReaders

- Monochrome eReader
- Color eReaders



Smart Devices

- Media Tablets
- IPTV/Streaming Media
- Smart Monitors
- Media Phones
- Printers
- Appliances
- Scanners

- Medical – Patient Monitoring
- Medical tablets
- Industrial tablets
- Smart Energy
- Factory Automation
- HMI
- Aerospace and Defense
- Digital Signage

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i.MX: Enable Multimedia Everywhere

It's about consumerization of… Everything

Car Infotainment
Medical
IPTV
IP Phones
Education Devices
Industrial HMI
Appliances
Metering
DECT Phones
Digital signage
In-flight Infotainment
Enterprise Tablets

From:

Specialized (low-end) hardware with RTOS

To:

High-performance hardware + OpenOS + Specialized apps

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i.MX Smart Devices, 1 of 2

Positivo i.MX53

Acer - i.MX51

Toshiba i.MX53

QOOQ - i.MX37

Fujitsu i.MX53

ZTE i.MX53

Creative Zen Touch 2 - i.MX51

Orange Tabbee 2

Isabella Visit - i.MX31

Hercules i.MX51

Logitech Squeezbox – i.MX25

Elonex eTouch

Telstra T-hub i.MX31

Technicolor Media Touch 2.0 – i.MX51

Huawei MC850 – i.MX51

RealEase Shogo – i.MX37

Philips Go Gear Connect – i.MX51

HP Photosmart eStation - i.MX51

Sharp Galapagos – i.MX51

Yulong "Coolpad N900

Genesi – i.MX51

China Telecom – Lifepad A800

Eren Eben- i.MX51

Logitech Harmony 1000 Remote i.MX21

Vodafone i.MX51

Kobo Vox i.MX51

Walnut Media eLearning Machine with i.MX233

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Creative – STMP3780

i.MX Smart Devices, 2 of 2

Giant Waterproof Tablet – i.MX53

Honeywell Lynx Touch security panel with the i.MX25

Icephone, Medical Phone with i.MX31

Navico Marine Navigation i.MX51

Maxtrack tablet for Brazilian Police with i.MX51

Avaak Vue Personal Video Network With the i.MX25

Invoxia IP Phone - i.MX503

Gigaset DECT phone with i.MX233

Sophia systems' non-contact card Reader/Writer for DoCoMo with i.MX51

AMX 20.3" Modero X Series Panoramic Table Top Touch Panel with i.MX53

Televic in Belgium trams using MX51

i.MX25 based picking application, logistics market system in warehouses

i.MX233 based i'mWatch

Japanese Boarding Gate Pass Reader with i.MX27

Self service touch screen terminal

Sharp e-Dictionary with i.MX28

Harris military communication equipment with i.MX27

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Some i.MX Smart Devices with telephony features

China Telecom
P7 Media Phone – i.MX51

Telstra T-hub – i.MX51

Gigaset DECT phone – i.MX233

Invoxia
HD Phone - i.MX50

Huawei MC850 – i.MX51

ACN IP Phone – i.MX27

Yulong TV phone – i.MX31

Skype DECT phone – i.MX28

PCCW Eye – i.MX21

BlackBerry Curve - MXC

Yulong smartphone – i.MX31

Orange Livephone Touch – i.MX31

PCCW Eye Home Smartphone – i.MX51

Coship E89 smartphone – i.MX31

Coolpad 8910 smartphone – i.MX51

Icephone Medical Phone – i.MX31

Avaak Vue Personal Video Network – i.MX25

Galentia Liverpool FC phone – i.MX31

i.MX2x : ARM9
i.MX3x : ARM11
i.MX5x : ARM Cortex A8

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Freescale-based E Ink eReaders

Amazon

Kindle DX & Kindle 2
i.MX31

Kindle 3
i.MX35

Kindle,
Kindle Touch
i.MX50

Sony

i.MXL

i.MX31

i.MX50

Kobo (Fnac/WHSmith)

i.MX35 **i.MX50**

Google / iRiver

i.MX50

Ectaco

i.MX50

Hanvon

i.MX51

i.MX50

Pocketbook

i.MX35 **i.MX50**

Bebook
Booq
i.MX31
Acer
Medion
i.MX35

Onyx
Greenbook
Jinke
i.MX50

freescale™

i.MX for General Embedded Highlights

- **Supply**
  - 10-15 year longevity commitment
  - Industrial & Automotive qualifications
  - Long history of strong partnerships with global distributors
- **Software**
  - Freescale coded, tested, and supported OSs (Android, Linux, Windows Embedded)
  - Free software codecs optimized for Freescale solutions.
  - Wide ecosystem to support tool chains, modules, system integrators, software and design services
- **Ease of Use**
  - All generally launched products are accessible via the web.
  - Quicker time to market through reference platforms
  - Integration of key peripherals (CAN,1588 Ethernet, dual Ethernet, boot modes, graphics and video accelerators, etc.) to reduce system cost and complexity, improve performance, lower power consumption
  - Low cost development systems such as the i.MX53 Quick Start Board.
  - Extensive i.MX community - www.imxcommunity.org
  - Part of a vast portfolio of product technologies offered by Freescale
  - Freescale is a leader in multiple markets (automotive, industrial, consumer, networking) – leveraging technology from all markets across product portfolios

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i.MX for Industrial

- Broad Software Support
  - Mature Freescale Linux offering. Charter member of Linaro
  - 3rd generation Android offering with 3.0 and 4.0 support in Q1 2012
  - 10+ years of Windows Embedded development
  - RTOS support including QNX, VxWorks, Integrity
  - Strong Ecosystem with Module Manufacturers and Software Integrators

- Industrial Environment and Peripheral Support
    - 3.3V IO
    - 0.8mm pitch package to reduce PCB & manufacturing cost
    - Flexible interface support including legacy interfaces – DDR2, DDR3, LVDS
    - Broad peripheral support – Gbit ethernet, CAN, SATA, PCI-E, LVDS
  - Extended Temp range available with full Industrial qualified parts

- Up to 15 year lifetime support for manufacturing

ARM920™	ARM926™ 400MHz	ARM1136™ 532MHz	ARM® Cortex A8 800MHz-1GHz	ARM® Cortex A9 1GHz-1.2GHz	ARM® Cortex A53 1.5GHz-2GHz

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Freescale Product Longevity Program

- The embedded market needs long-term product support
- Freescale has a longstanding track record of providing long-term production support for our products
- Freescale is pleased to provide a formal product longevity program for the market segments we serve
- For the automotive and medical segments, Freescale makes a broad range of devices available for a minimum of 15 years
- For all other market segments in which Freescale participates, Freescale makes a broad range of devices available for a minimum of 10 years
- Life cycles begin at the time of launch
- A list of participating Freescale products is available at: www.freescale.com/productlongevity

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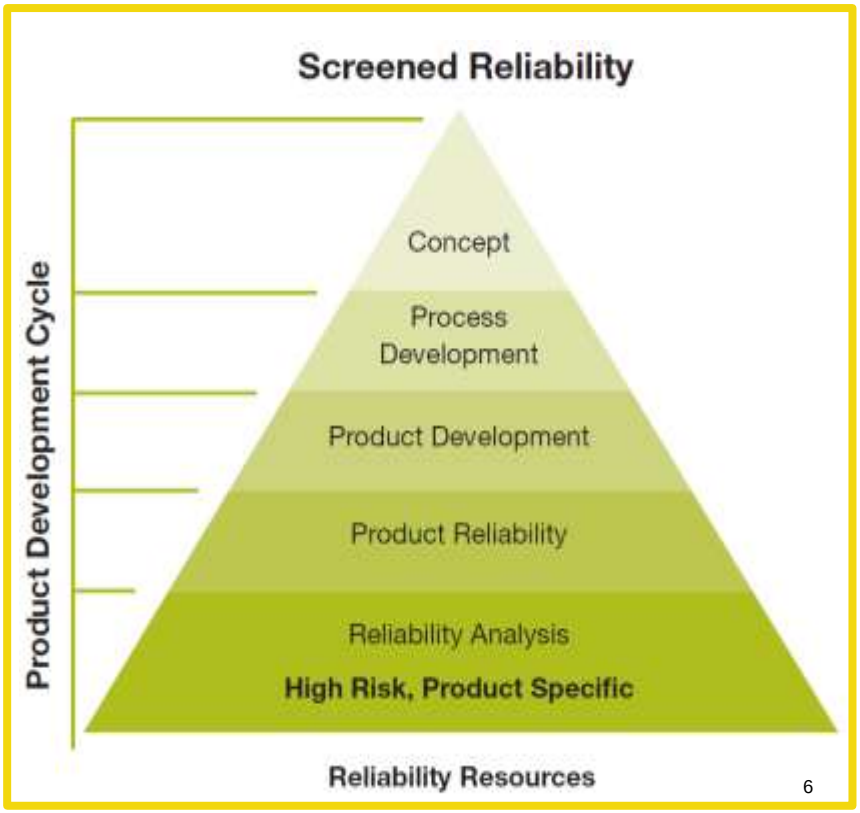
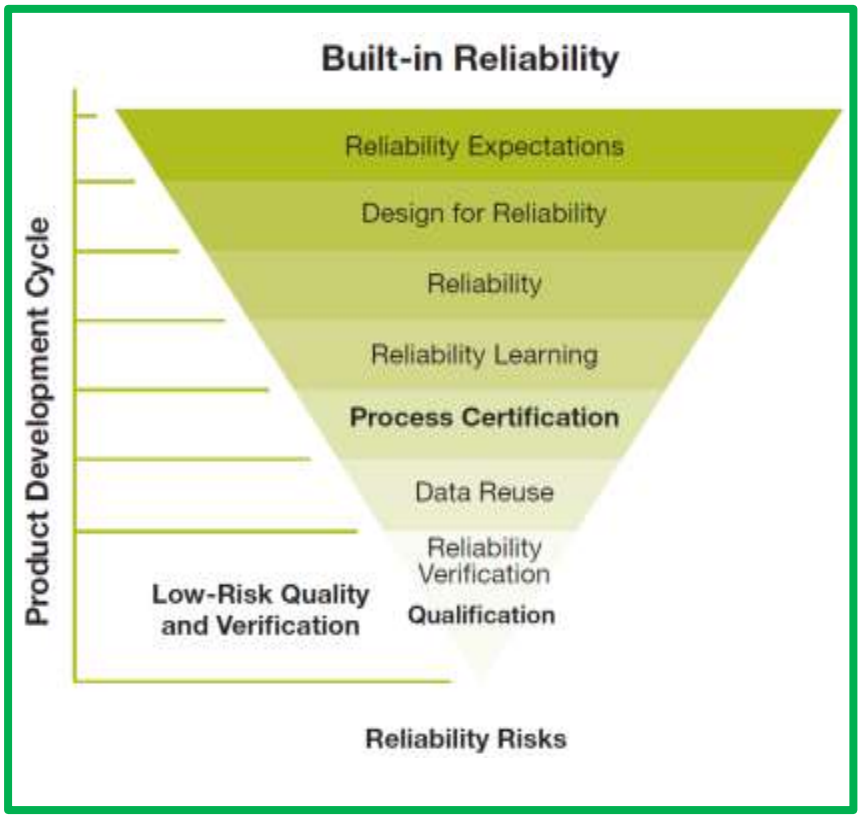
Freescale Quality Commitment





i.MX Value

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Long Product Lives	Vast Ecosystem	Power & Performance Leadership
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Six Generations of Applications Processors

1995	2001	2003	2005	2009	2011
Dragonball 1st FSL Apps Processor	**i.MX1** 1st FSL ARM9 Apps Processor	**i.MX2 Series** 90nm LP HW Video Accel Analog Integration	**i.MX3 Series** ARM11 GPU Integration	**i.MX5 Series** 65nm LP/GP ARM Cortex-A8 >1GHz	**i.MX 6 Series** 40nm LP ARM Cortex-A9 Multi-core family

50+ Products
>150M Units

- **Clear market leader** for eReader applications processors (IDC)
- **No. 1** in Applications Processors (IDC 12/2011)
- **No. 2** in Auto Infotainment (Strategy Analytics)

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Freescale i.MX Applications Processors

i.MX 6Quad

High Performance Tablet

Media Box

Luxury Infotainment

Advanced HMI

i.MX 6Dual
i.MX 6DualLite

i.MX53

Color eReader

Business Tablet

Mainstream Infotainment

Medical

i.MX 6Solo
i.MX 6SoloLite

i.MX28, i.MX233, i.MX25, i.MX35, i.MX50

Monochrome eReader

Single Function Tablet

Connected Radio

Smart Energy Meter

Performance/ Multimedia Capability

Content Creation, Technology Driver

Good, Better, Best Differentiation

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i.MX 6 Series

- Industry's Most Scalable ARM Processors

Build **scalable product lines** with **ultimate versatility**

Software and hardware compatibility across single, dual and quad core devices

Easy to use development kits

Best-in-class performance, low power consumption and bleeding-edge multimedia and graphics

Optimized peripheral sets tailored to serve automotive, industrial and consumer markets

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i.MX 6: One Platform, Differentiated Products

Saves **development costs** and **improves time to market**.
Scalability with multiple cores is **key** to implement this strategy.

Smart Device Design

Quad Core

High-End (6Quad)

IPTV
High Performance Tablet
Auto Infotainment

Dual Core

High-End (6Dual)

Low-End (6DualLite)

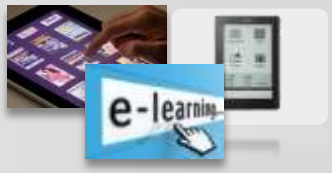
Smart Monitor
Business Tablet
Media Tablet
IP Phone
Tablets for Kids
Mainstream Infotainment
Color eReaders

Single Core

High-End (6Solo)

Low-End (6SoloLite)

Smart Energy
eReaders
Entry Auto Infotainment



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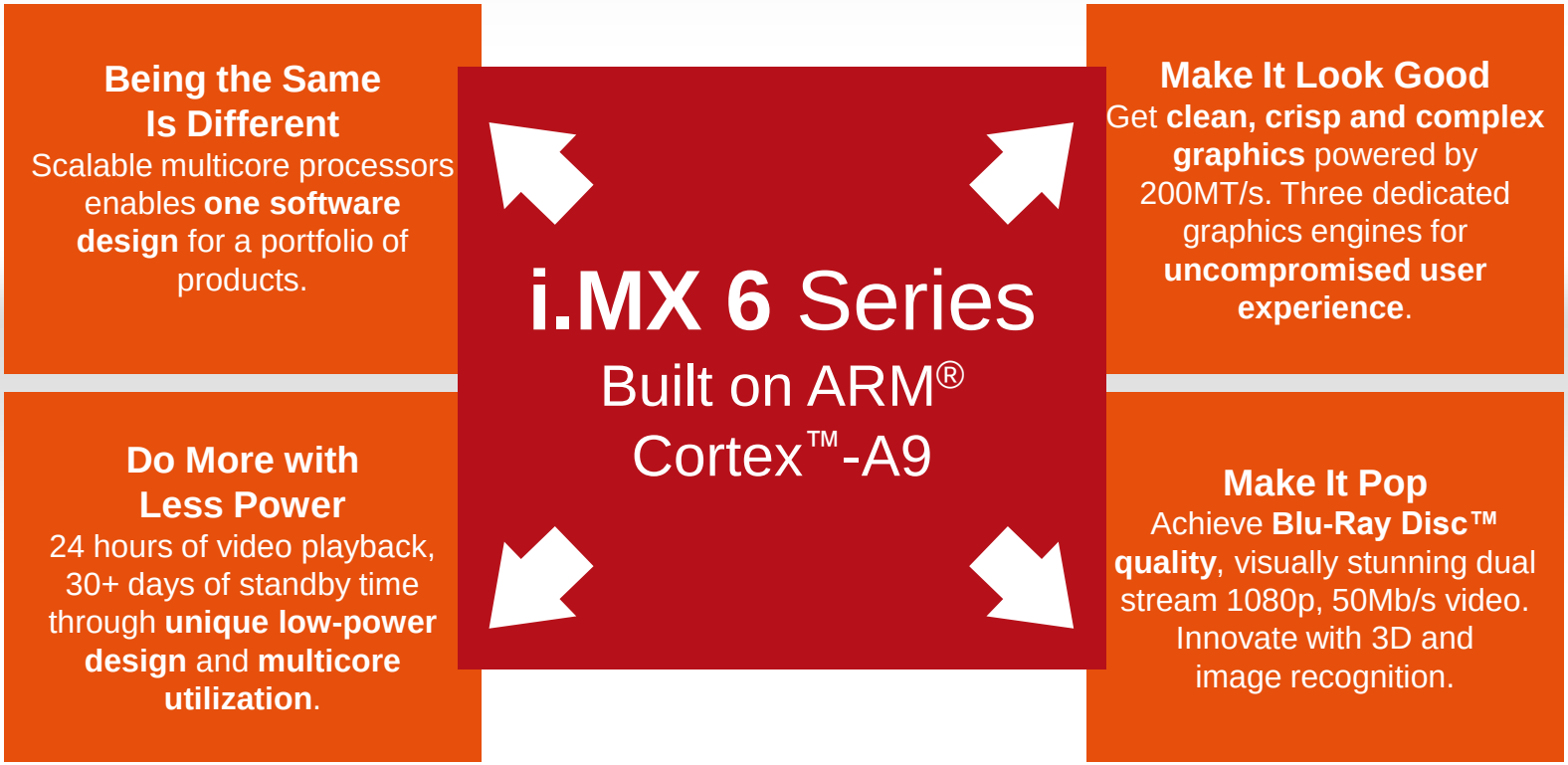
Enabling Next Generation Consumer Products


Being the Same Is Different
Scalable multicore processors enables one software design for a portfolio of products.
i.MX 6 Series
Built on ARM® Cortex™-A9
Make It Look Good
Get clean, crisp and complex graphics powered by 200MT/s. Three dedicated graphics engines for uncompromised user experience.
Do More with Less Power
24 hours of video playback, 30+ days of standby time through unique low-power design and multicore utilization.
Make It Pop
Achieve Blu-Ray Disc™ quality, visually stunning dual stream 1080p, 50Mb/s video. Innovate with 3D and image recognition.

Industry's most *scalable* and *powerful* platform for multimedia and display applications

freescale™

Supreme Scalability and Flexibility: Leverage One Design Into Diverse Product Portfolio

Scalable series of five ARM Cortex A9-based SoC Families

i.MX 6 SoloLite

i.MX 6 Solo

i.MX 6 DualLite

i.MX 6 Dual

i.MX 6 Quad

Pin-to-pin Compatible

Software Compatible

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i.MX 6 Series At a Glance

Red indicates change from column to the left

i.MX 6SoloLite

- Single ARM® Cortex™-A9 at 1.0GHz
- 256KB L2 cache, Neon, VFPvd16, Trustzone
- 2D graphics
- 32-bit DDR3 and LPDDR2 at 400MHz
- Integrated EPD controller

i.MX 6Solo

- Single ARM Cortex-A9 at 1.0GHz
- **512KB** L2 cache, Neon, VFPvd16, Trustzone
- **3D graphics** with 1 shader
- 2D graphics
- 32-bit DDR3 and LPDDR2 at 400MHz
- Integrated EPD controller

i.MX 6DualLite

- **Dual** ARM Cortex-A9 at 1.0GHz
- 512KB L2 cache, Neon, VFPvd16, Trustzone
- 3D graphics with 1 shader
- 2D graphics
- **64-bit** DDR3 and 2-channel 32-bit LPDDR2 at 400MHz
- Integrated EPD controller

i.MX 6Dual

- **Dual** ARM Cortex-A9 at 1/**1.2GHz**
- **1 MB** L2 cache, Neon, VFPvd16, Trustzone
- 3D graphics with **4 shaders**
- **Two** 2D graphics engines
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at **533MHz**
- Integrated **SATA-II**

i.MX 6Quad

- **Quad** ARM Cortex-A9 at 1.2GHz
- 1 MB L2 cache, Neon, VFPvd16, Trustzone
- 3D graphics with 4 shaders
- Two 2D graphics engines
- 64-bit DDR3 and 2-channel 32-bit LPDDR2 at 533MHz
- Integrated SATA-II

i.MX 6 Series Highlights

- ARM Cortex-A9 based solutions ranging up to 1.2GHz
- HD 1080p encode and decode (except 6SL)
- 3D video playback in High definition (except 6SL)
- Low power 1080p playback at 350mW Integrated IO's that include HDMI v1.4, MIPI and LVDS display ports, MIPI camera, Gigabit Ethernet, multiple USB 2.0 and PCI-Express
- SW support: Google Android™, Windows® Compact 7, Linux®, QNX

Features vary by product family

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Intelligent Integration of Multimedia

i.MX 6Dual/6Quad VPU

-H.264 MVC1080p60 decode
-H.264 MVC 720p60 encode
- 350mW power consumption for single video!

i.MX 6Dual/6Quad IPU

- Four Display support (2x MIPI-DSI, Parallel, HDMI v1.4a)
- Stereoscopic camera input
- Color adjustments and gamut mapping
- Gamma correction and contrast stretching
- Compensation for low-light conditions & backlight reduction

Recording Video

Movie Content

Game Content

Image capture

VPU

2D/3D Graphics

2x/4x ARM Cortex- A9s

IPU

3D LCD

Publish

3D Television

i.MX 6Dual/6Quad Triple-Play Graphics

- 3 engines: 3D, OpenVG and BLT
- 200 MT/s, 4 shaders, 3 separate engines
- High quality 3D games optimized for mobile
- Augmented reality views (real world + 3D objects)
- Advanced 3D video formats (source/depth format)

i.MX 6Dual/6Quad– 2x/4x cores

- Create, transform, enhance, & publish multimedia fast!
- Intuitive User Interfaces for content viewing
- Scalability for 'the next big use case'

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i.MX ARM9 Portfolio

Feature	i.MX25x	i.MX233	i.MX28x
RAM	128KB	32KB	128KB
Flash Interface	MLC/SLC NAND Flash w/ 8-bit RS, NOR Flash	SLC/MLC/Managed NAND Flash 20-bit BCH, 8-bit RS	SLC/MLC/Managed NAND Flash w/ 20-bit BCH
DRAM Interface	150 MHz 16-bit DDR2, mDDR, SDRAM	150 MHz 16-bit DDR1, mDDR	200 MHz 16-bit DDR2, LV-DDR2, mDDR
LCD	1 overlay, alpha blending, panning	8 overlays, alpha blending, scaling, rotation, color space conversion	8 overlays, alpha blending, scaling, rotation, color space conversion
Integrated TV-Out	-	Yes	Yes
CMOS Sensor Interface	Yes	-	-
CAN	x2	-	x2
10/100 Ethernet	Single 10/100	-	Dual 10/100 (1588 H/W Time stamping) and L2 Switch
Analog Audio	External	Integrated stereo ADC/DAC with amps, Mono speaker amp output	External
S/PDIF Interface	No	1 output	1 output
Power Management	External	Integrated	Integrated
USB 2.0	HS port (Host/Device) HS PHY x1, HS Host with FS PHY x1	HS port (Host/Device) with PHY x1	HS Host/Device with PHY x1, HS Host with PHY x1
SIM	x2	-	-
P-ATA	Yes	-	-
Security	Equivalent capabilities, Tamper Detection, RNG	Equivalent capabilities, PRNG	Equivalent capabilities, HAB4, PRNG

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i.MX25 Target Markets

Industrial

- HMI (Factory Automation & Building Control)
- Smart Meters
- General Embedded / Consumer

Point Of Sale

- Secure ePOS Terminals
- Data Acquisition (Scanners)
- Fixed and Handheld Printers

Feature	Benefit
Integration and Connectivity – Ethernet, CAN, SDIO, Touchscreen Controller, DDR2, USB PHY, Camera I/F	Reduced system cost and complexity, greater product feature scalability
LCD Controller	Can drive high color VGA displays for information display and user interaction
Security	Robust, tamper-resistant devices for secure applications
Industrial qualification and product longevity	Supports the full life of the product in the field
Windows CE and Linux BSP's	Reuse software across i.MX platforms
Optimized performance and power consumption	Fanless automation, increased battery life for portable equipment

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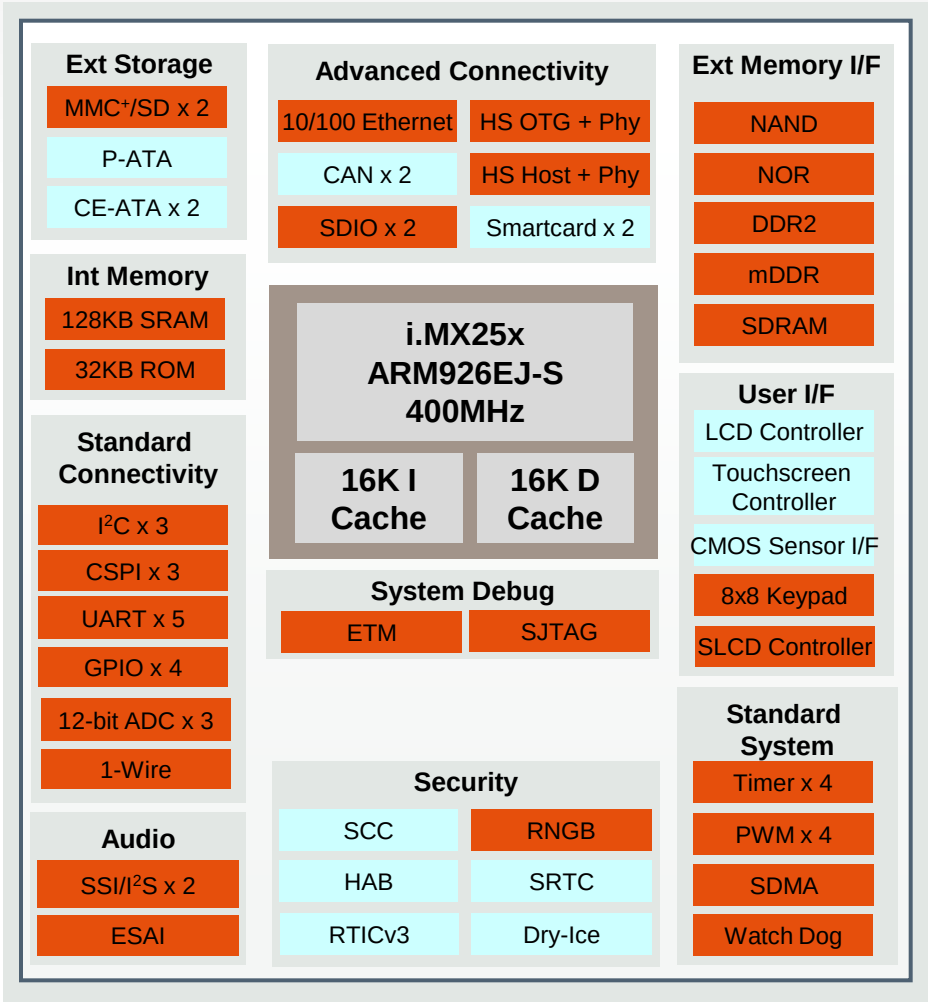
i.MX25x Family

- **Key Features and Advantages**
  - 400MHz ARM926EJ-S™, 16KB L1 I/D-Cache
  - 128KB on-chip SRAM for low power LCD refresh
  - External memory interface: DDR2, mDDR, or SDRAM up to 133MHz, 16-bit data bus
  - Supports off-chip NAND or NOR Flash
  - 10/100 Ethernet MAC with RMII support
  - USB 2.0 OTG w/ HS PHY, USB 2.0 Host w/ FS PHY or ULPI
  - Two CAN interfaces
  - Two Smartcard interfaces
  - SDIO interface for external Wi-Fi module
  - VGA (800x600) LCD controller, Resistive touchscreen controller
  - CMOS sensor interface
  - P-ATA for external CD connection or HDD
  - CE-ATA and SD/MMC+ for external storage
  - Enhanced serial audio interface
  - 3 general purpose 12-bit ADC channels
  - UART's, CSPI's, I^2C, I^2S
  - Enhanced security features, including secure boot and tamper detection (i.MX258, i.MX251, i.MX255 only)
- **Available Parts**
  - i.MX251, i.MX255, i.MX253, i.MX257, i.MX258
- **Package and Temperature**
  - 0.8mm,400-pin MAPBGA, 0.5mm,400-pin MAPBGA (i.MX257 only)
  - -20C to +70C, -40C to +85C temperature options



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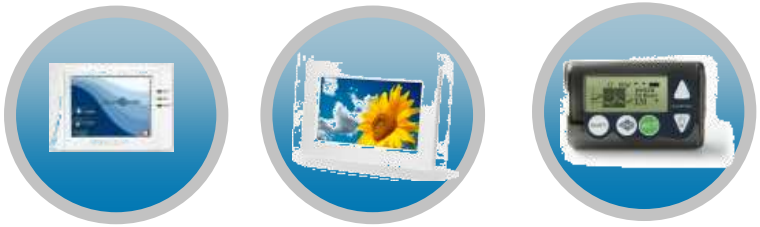
i.MX28 Target Applications

Industrial

- Smart Energy - Gateways/Meters
- HMI - Factory Automation
- HMI – Building Control
- Industrial Control
- Fixed and Handheld Printers

Home and Office



- HMI (Appliances, Security Panels, Automation)
- Portable Medical
- Media Gateways/Accessories

Automotive

- Audio Connectivity
- CAN Gateways

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The i.MX28 processor family reaches new levels of integration in an ARM9 device, with on-chip display, power management and connectivity features. Easy-to-use tools and software help you design differentiated industrial, automotive and consumer products in less time.

Industrial-Strength Integration

- WVGA LCD controller with touchscreen for display-centric applications
- Numerous connectivity options including dual 10/100 Ethernet (1588 capable) with L2 switch

Industry-leading Power Management

- Integrated power management simplifies customer design and saves on system cost
- <0.5 W performance under harshest conditions

Comprehensive Enablement

- Software BSPs and multimedia codecs available and supported by Freescale at no added cost
- Freescale-owned development system priced at <$400 include access to all design and layout files.

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i.MX28 Family Product Comparison

Feature	i.MX280	i.MX283	i.MX286	i.MX287
On-chip RAM	128KB	128KB	128KB	128KB
Memory Interface	NAND Flash, DDR2, mDDR, LV-DDR2	NAND Flash, DDR2, mDDR, LV-DDR2	NAND Flash, DDR2, mDDR, LV-DDR2	NAND Flash, DDR2, mDDR, LV-DDR2
LCD w/ TS	-	Yes	Yes	Yes
Security	Yes	Yes	Yes	Yes
Ethernet	x1	x1	x1	x2
L2 Switch	-	-	-	Yes
CAN	-	-	x2	x2
12-bit ADC	x8	x8	x8	x8
High Speed ADC	x1	x1	x1	x1
USB2.0	OTG HS with HS PHY x1 HS Host with HS PHY x1	OTG HS with HS PHY x1 HS Host with HS PHY x1	OTG HS with HS PHY x1 HS Host with HS PHY x1	OTG HS with HS PHY x1 HS Host with HS PHY x1
SDIO*	x3	x3	x3	x4
SPI*	x3	x3	x3	x4
UART*	x6	x6	x6	x6
PWM*	x8	x8	x8	x8
S/PDIF Tx	-	-	Y	Y
Package	14x14 0.8mm 289 BGA	14x14 0.8mm 289 BGA	14x14 0.8mm 289 BGA	14x14 0.8mm 289 BGA

* Represents maximum available – some pins are shared with other interfaces

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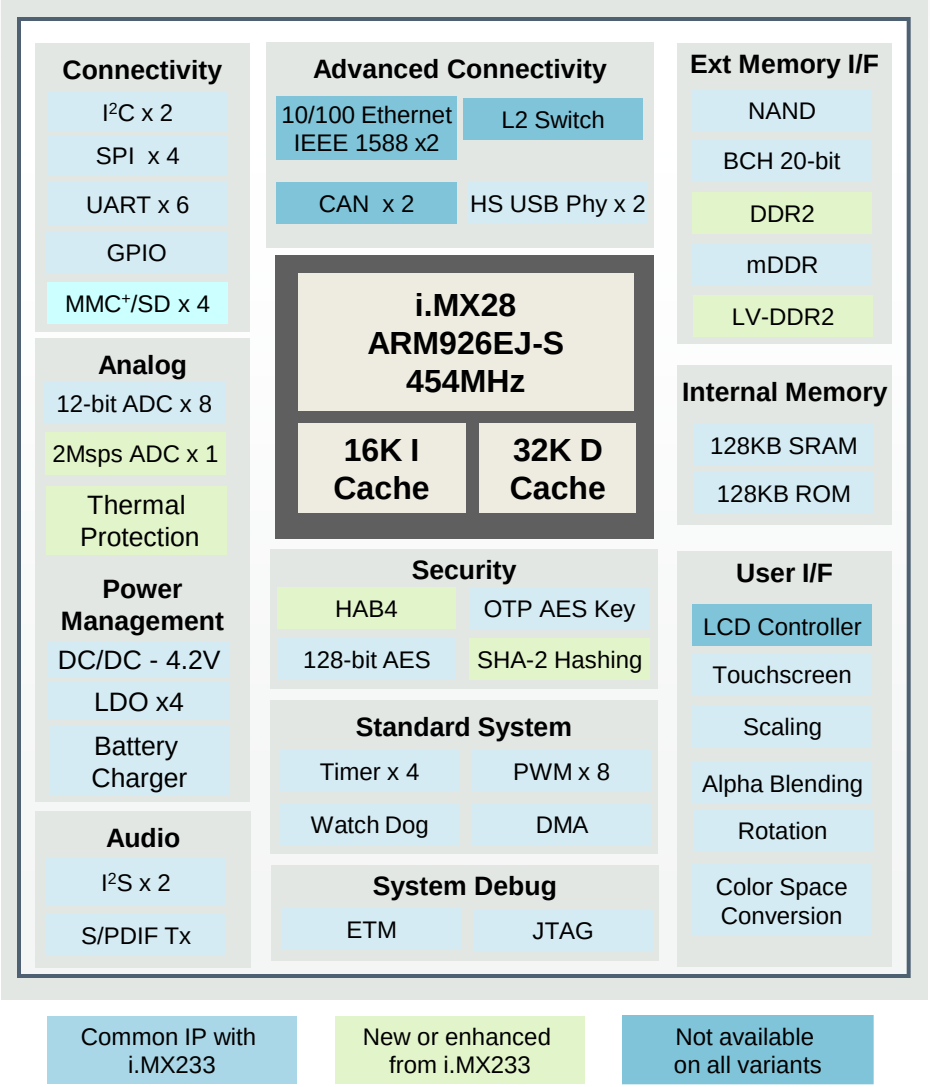
i.MX28x Family

- **Key Features and Advantages**
  - 454MHz ARM926EJ-S core w/ 32KB Cache
  - PMU with high efficiency on-chip DC/DC, supports Li-Ion batteries, battery charging
  - 10/100 Dual IEEE 1588 Ethernet with RMII support and L2 Switch
  - Dual CAN interfaces
  - LCD Controller with Touchscreen
  - NAND support – SLC/MLC and eMMC 4.4 managed
  - Hardware BCH (up to 20-bit correction)
  - 200 MHz 16-bit DDR2, LV-DDR2, mDDR external memory support
  - Dual High speed USB with embedded PHY
  - Up to 8 General purpose 12-bit ADC channels and single 2 Msps ADC channel
  - Temperature sensor for thermal protection
  - Multiple connectivity ports (UART,SSP,SDIO,SPI,I²C,I²S)
  - <0.5 Watt performance in harshest conditions
  - Family of products supporting various feature sets
- **Package and Temperature**
  - 289 BGA 14x14mm 0.8mm pitch
  - -40C to +85C (Industrial, Automotive)
  - -20C to +70C (Consumer)



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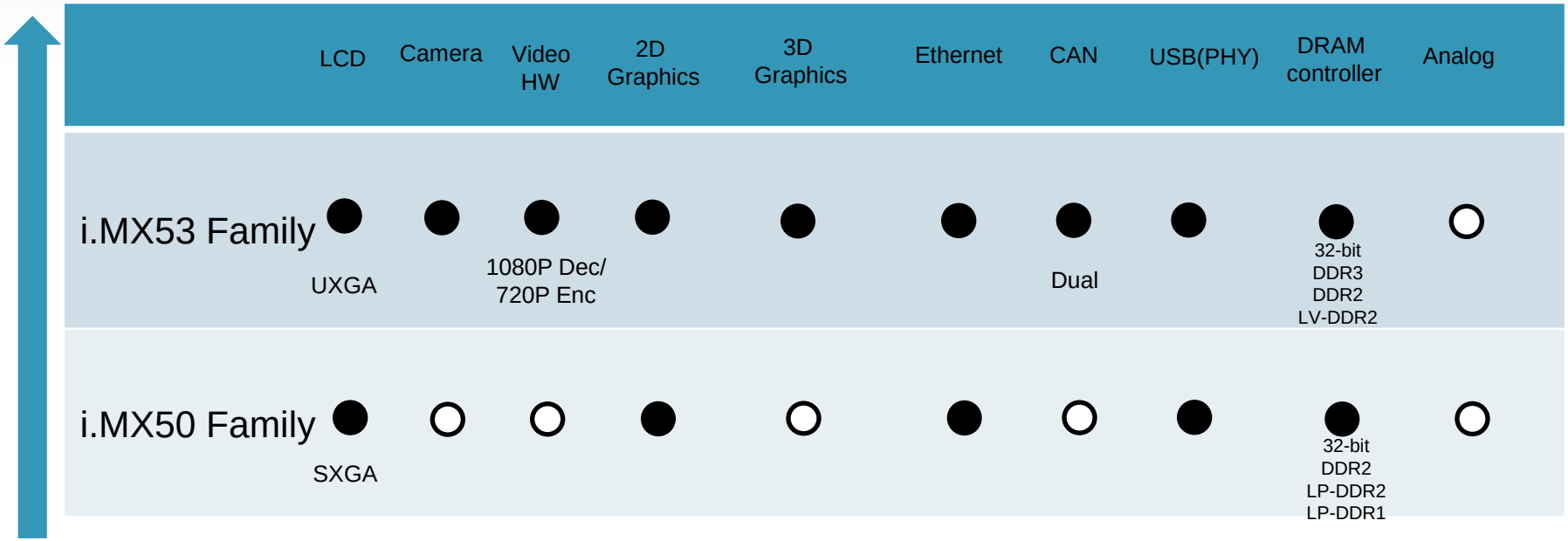
Freescale's Cortex A8 Product Portfolio



From low cost to high definition and everything in between

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i.MX5x Cortex-based SoC Feature Summary

	i.MX51	i.MX503	i.MX508	i.MX53
Sample w/BSP	Now	Now	Now	Now
Qual / Final BSP	Now	Now	Now	Now
Core	Cortex-A8 800MHz(Consumer) 600MHz (Automotive)	Cortex-A8 800MHz(Consumer)	Cortex-A8 800MHz(Consumer)	Cortex-A8 **Up to 1.2GHz** (Consumer) **Up to 1GHz** (Automotive)
Memory	512MB, x32 mDDR / DDR2	**2GB, x32** DDR2 / mDDR / **LP-DDR2**	2GB, x32 DDR2 / mDDR / LP-DDR2	2GB, x32 DDR2 / **DDR3 /** LP-DDR2
Max Mem Speed	400MT/s (200 MHz clock)	**533MT/s (266 MHz clock)**	533MT/s (266 MHz clock)	**800MT/s (400MHz clock**)
Video Decode	720p30	N/A	N/A	**1080p30**
Video Encode	D1	N/A	N/A	**720p30**
3D GPU	OpenGL/ES 2.0 27M tri/s, 166M pix/s	N/A	N/A	OpenGL/ES 2.0 **33M** tri/s, **200M** pix/s
2D GPU	OpenVG 1.1, 166M pix/s	OpenVG 1.1**, 200M** pix/s	OpenVG 1.1, 200M pix/s	OpenVG 1.1, 200M pix/s
LCD Resolution	WXGA (1280x800) 60fps	**SXGA+ (1400x1050)60fps**	SXGA+ (1400x1050)60fps	**UXGA (1600x1200) 60fps**
Display Interface	LCD, Parallel	LCD, Parallel	**EPD Controller**	LCD, Parallel, **LVDS**
EPD Controller	N/A	N/A	**(2048x1536) @106 Hz**	N/A
Video Out	Component HD720 60fps	N/A	N/A	**VGA HD1080p60**
Camera I/F	Parallel	N/A	N/A	Parallel
HDD I/F	P-ATA	N/A	N/A	P-ATA, **S-ATA 1.5Gbps**
Ethernet	10/100Mbps	10/100Mbps	10/100Mbps	10/100Mbps
USB	OTG + PHY Host + ULPI (x3)	OTG + PHY, Host + PHY	OTG + PHY, Host + PHY	OTG + PHY, Host + PHY Host + ULPI (x2)

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i.MX50 Target Markets

- eReaders
- Portable navigation
- DECT phones
- Kiosks
- Signage
- Patient / client monitoring
- Home and office automation

Feature	Benefit
Optimized performance and power consumption	Increased battery life for portable equipment
Memory	**2X** more memory bus bandwidth than competitive solutions @**266 MHz** = faster connection to memory for quicker response times
Display Controllers	Can drive high resolution, high color LCDs, in addition to EPD's
Graphics	Hardware-accelerated graphics rendering for feature-rich UI
Integration and Connectivity – Ethernet, SDIO, DDR, USB PHY,	Reduced system cost and complexity, greater product feature scalability
Security	Robust, tamper-resistant devices for secure applications
Proven power management solution	MC34708 optimized for i.MX50 and supported and supplied from single supplier

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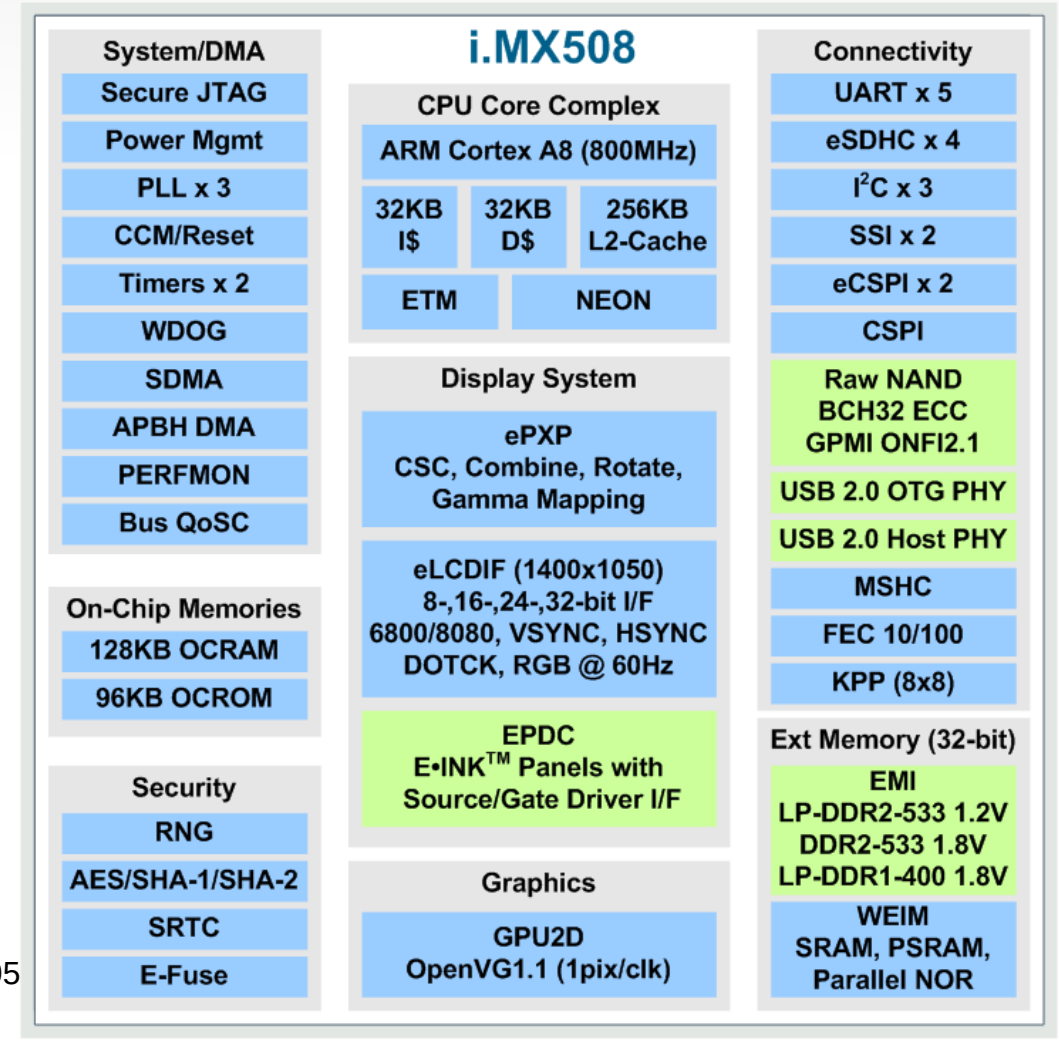
i.MX508 Block Diagram

Specifications:

- **CPU:** ARM Cortex-A8 800MHz
- **Process**: 65nm, LP/GP
- **Core Voltage**: 0.7-1.1V
- **Temp Range:** 0 to 70C
- **Package**: 13x13 0.5mm
  17x17 0.8 mm

Features and Advantages

- High Performance CPU : Cortex-A8
- Advanced power management features
- Integrated E INK EPD Controller
- Low Power LP-DDR2 support
- eMMC 4.4/SDIO
- NAND 32-bit ECC and ONFI2.1/Toggle
- Dual USB PHY (HS/OTG, HS/Host)
- Flexible LCD display support up to 1400x105



Features to lower system cost

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i.MX53 Target Markets

Consumer

- Tablet
- Personal Navigation
- Mobile Internet Devices
- Video-enabled IP Phone
- Digital Photo Frame
- Connected TV
- Smart Monitor

Industrial

- Security and Surveillance
- Industrial HMI
- Digital Signage / Kiosks
- Barcode Scanners
- Printers

Automotive

- Connectivity and Telematics
- Digital Instrument Clusters
- Video and Navigation

Medical

- Patient Monitors
- Telehealth
- Infusion Pumps

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i.MX53 Family Value Proposition

Take Your Multimedia Experience to the Max

The low-power i.MX53 family offers ultra-fast processing and full HD capability to provide the ultimate user experience.

- **Full HD Capability:** The i.MX53 is the first i.MX processor to offer full HD video playback, for a stunning visual experience
- **Best-in-Class Performance and Integration:** The highly integrated i.MX53 offers fast processing and features hardware accelerators, improving graphics performance and reducing power consumption
- **Beyond the Chip:** Highly optimized hardware and software solutions that simplify out-of-box development and speed time to market

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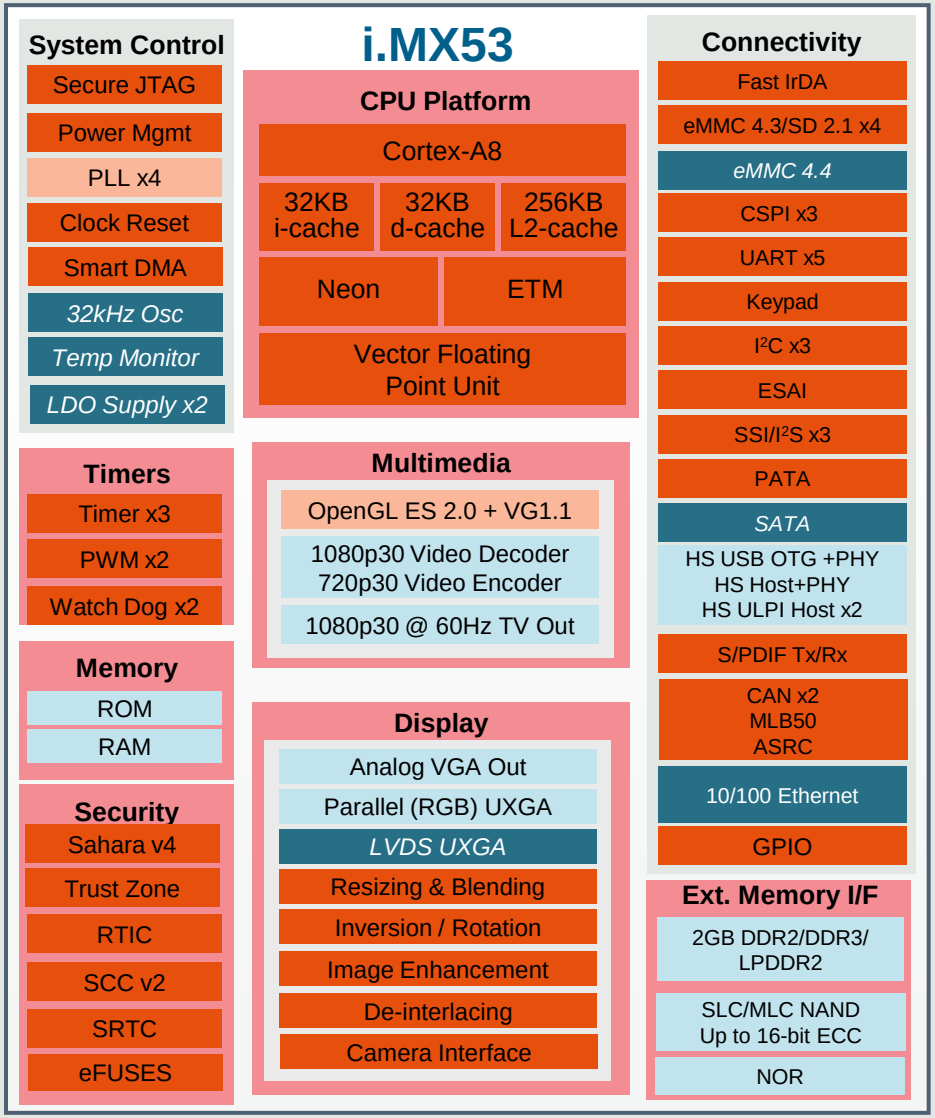
i.MX53 Block Diagram

- **Specifications:**
  - **CPU:** Cortex-A8
    1.0GHz – Consumer
    800MHz – Automotive/Industrial
  - **Process:** 65nm, LP/GP
  - **Core Voltage:** 0.85V-1.3V
  - **Package:** 19x19 0.8mm 529 ball BGA
    12x12 0.4mm PoP (Consumer)
  - **Case Temp:** -20 to 70C (Consumer)
    -40 to 85C (Automotive/Industrial)
- **Key Features and Advantages**
  - High performance CPU: Cortex A8
  - 2GB DDR2/3, LPDDR2 memory at 400MHz
  - HDD: PATA, S-ATA interface
  - One eSDHC ports supports MMC4.4 including DDR mode
  - Ethernet 10/100 with IEEE1588
  - Delivers rich graphics and UI in HW
  - OpenGL ES 2.0 3D accelerator (AMD Z430)
  - OpenVG 1.1 graphics accelerator (AMD Z160)
  - Neon Vector floating point co-processor
  - Display up to UXGA (1600x1200)
  - Drives high resolution video in HW
    - Multi-format HD1080 video decode
    - Multi-format HD720 video encode
    - High quality video processing (resizing, de-interlacing, etc)
    - Displays: Parallel, LVDS or VGA
  - Audio:
  - I²S, S/PDIF Rx/Tx, ESAI
  - Secure boot (HAB), cryptographic accelerators, TZ
  - More analog integration: simplified system, reduced system BOM
  - Temperature Monitor for smart performance control
  - Linear supply regulators
  - 32KHz Oscillator



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The Home Health Hub Platform

Optional Tablet with Medical User Interface
i.MX6

Physician
Monitoring Center
Loved Ones
Social Network

Wi Fi Ethernet

HHH Ref Platform Gateway
i.MX28

HOME AUTOMATION

HHH Ref Platform Expansion Capabilities

Wi Fi
Smart Plugs
Smart Appliances
Safety/Security
Lighting Control
Local Display

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TELE-HEALTH

868MHz RF
Bluetooth HDP
Bluetooth SPP
Bluetooth Low Energy
USB

HHH Panic Alarm MC12311
Blood Glucose Meter
Thermometer
Blood Pressure Monitor
Weight Scale
Nonin Pulse Ox MC9S08GP32

Wired connection
Wireless connection
Medical monitoring
WWW connection

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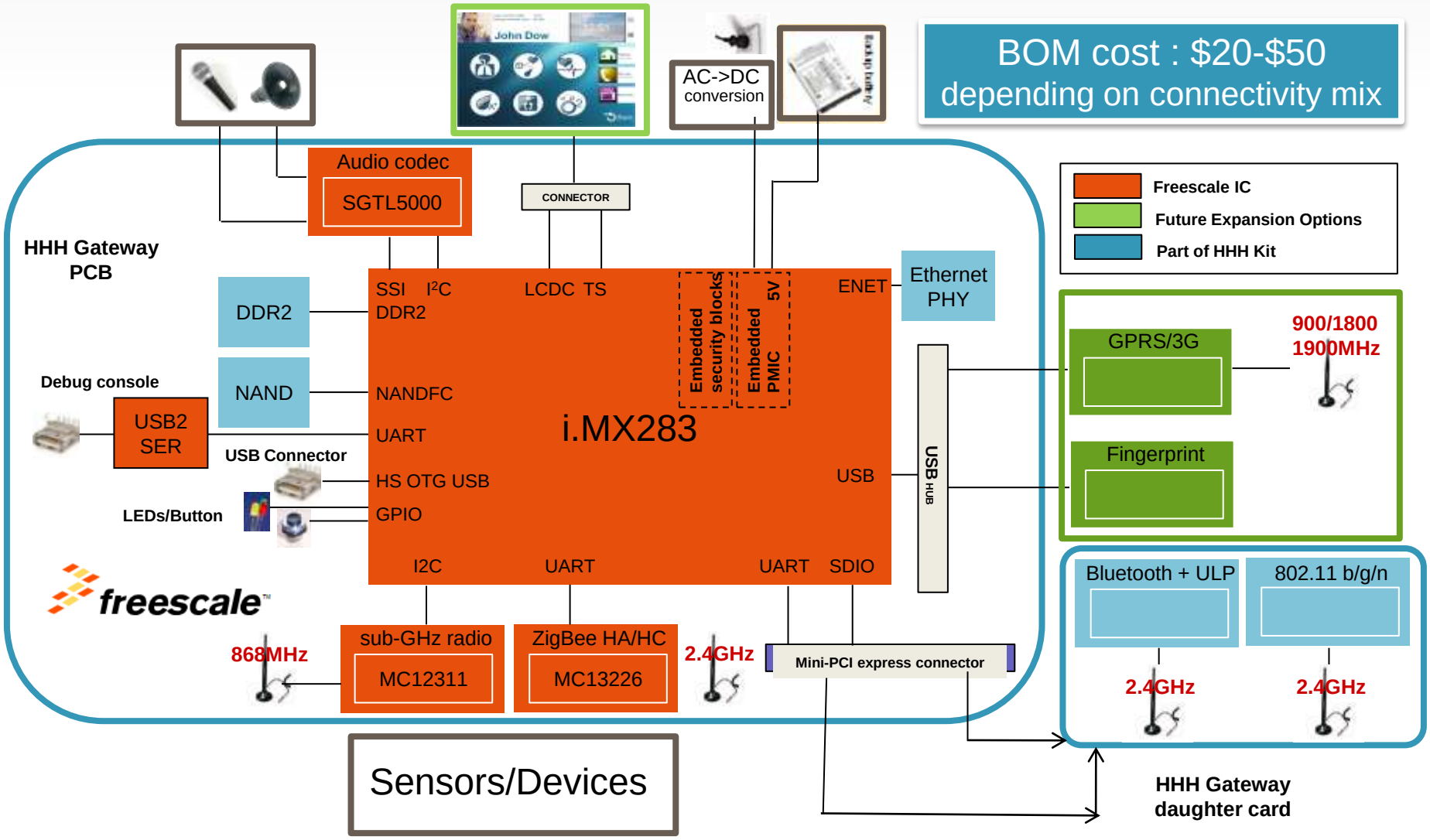
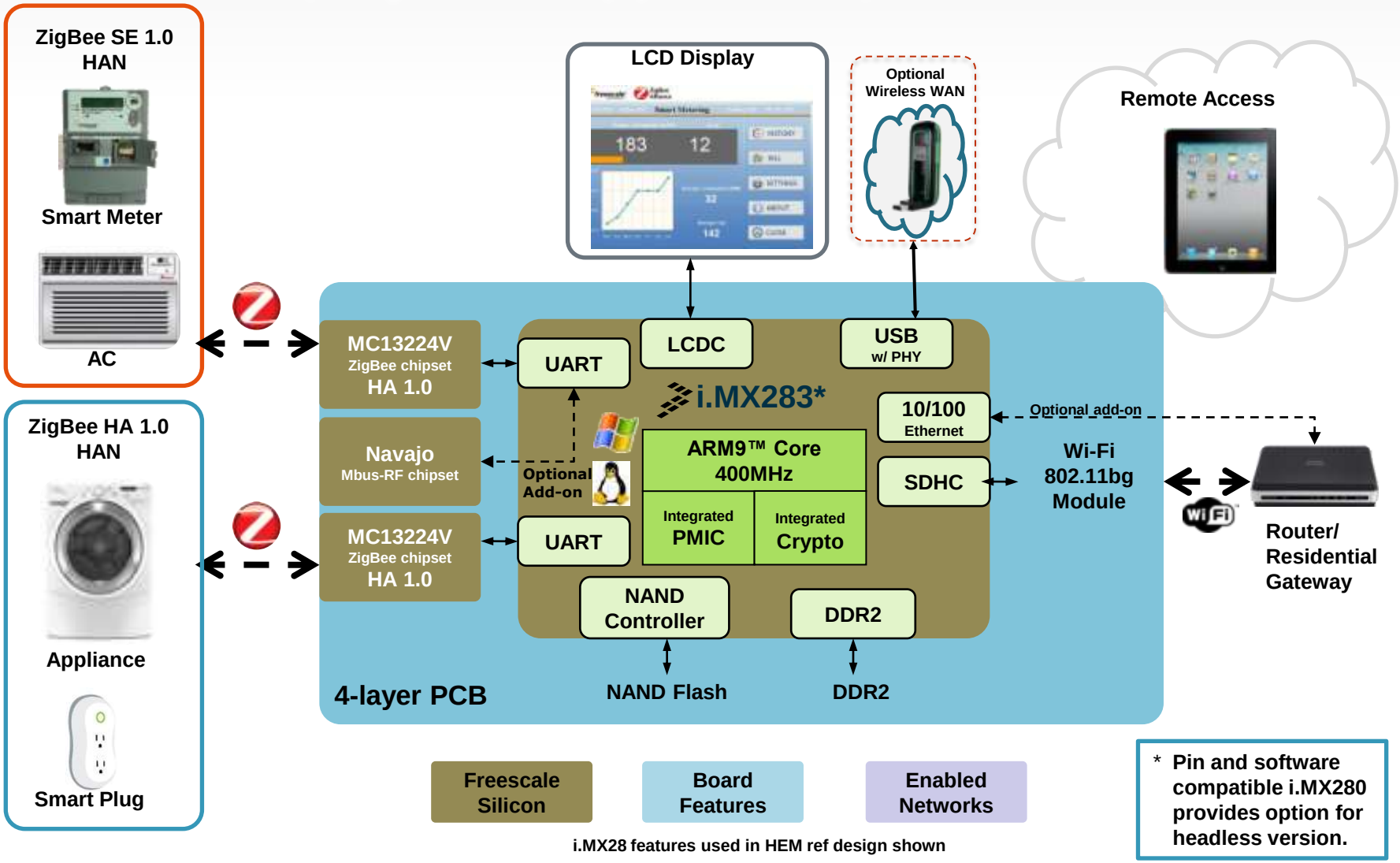
HHH Reference Platform Block Diagram



The i.MX28 Home Energy Manager - Reference Platform (Adjacent Application)



i.MX28 features used in HEM ref design shown

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i.MX Value

Freescale is a trusted provider of high quality technical solutions that enable the development of breakthrough Smart Devices

Trusted Partner	Enablement	Technology Leadership
Freescale is on your team, delivering innovative products with long lives and the quality you expect from a leader.	**Freescale's ARM portfolio** has the technical infrastructure to provide the highest level of support in the IC industry	**Freescale's i.MX family includes a wide range of platforms** giving customers access to the necessary components for designing breakthrough embedded systems
Embedded Leadership	Development Platforms	Broad Portfolio
Long Product Lives	Vast Ecosystem	Power & Performance Leadership
Quality	Software Completeness	Scalable Platforms
Service	Ease of Use	Targeted Reference Designs

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i.MX50 Development Platforms

i.MX50 Family Processors

- The i.MX50 Evaluation Kit (EVK) is a cost effective platform for developing products based on i.MX50 processors
- Small, single board design including the complementary MC34708 PMIC
- Support for multiple display options including HDMI, LCD or EPD

SABRE Platform for eReaders

- The Smart Application Blueprint for Rapid Engineering (SABRE) series introduces the SABRE platform for eReaders based on i.MX50
- Enables EPD display, touch control, audio playback and the ability to add WLAN, a 3G modem or Bluetooth
- Includes the MC34708 PMIC and Freescale MMA8450QT three-axis digital accelerometer

i.MX50 EVK : $499 USD MSRP

SABRE platform for eReaders: $998 USD MSRP

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i.MX50 Development Platform Key Features

Processor
- Freescale i.MX50 800 MHz ARM® Cortex™-A8 CPU
- Freescale MC34708 PMIC

Memory
- 512 MB Double Data Rate2 Mobile (LPDDR2) DRAM memory
- Socket for raw NAND Flash (48-TSOP)
- Footprint for Managed NAND (eMMC/eSD)
- SPI Flash
- Two Secure Digital (SD)/multimedia card (MMC) sockets

Display
- HDMI digital video output connector
- Parallel WVGA LCD add-on card via expansion connector
- EPD add-on card via expansion connector
- EPD board (SABRE)

Audio
- Freescale SGTL5000 audio codec
- Audio HP Jack
- External speaker connection
- Microphone

Connectivity
- USB Host connectors
- Micro USB OTG connector
- Ethernet (10/100T) connector
- SIM Card Socket
- Mini PCIe connector

Debug
- JTAG connector
- One console UART

Other
- MMA8450QT three-axis digital accelerometer (SABRE)

Tools & OS Support
- VMware player to bring up image on a Windows PC
- Linux and Android from Freescale
- LTIB

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i.MX53 Reference Designs

Quick Start Board

- Cost-effective, open source development platform
- Designed to simplify product evaluation

SABRE for Tablets

- Smart Device Market-focused
- Form-factor ready to accelerate design and time to market

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i.MX SABRE for Automotive Infotainment Modular Reference Design Concept

- CPU Card
  - Capable of stand-alone operation
  - Processor, memory, power, USB, Ethernet, SD-card slot, Display
  - Attaches to Application Module for more comprehensive system evaluation and application benchmarking
  - Industry standard MXM 3.0 connector

- Wireless Modules
  - GPS Module
  - Bluetooth/Wi-Fi Module
  - 3G Modem Module
  - Radio Tuners
  - IAP

- Main Board
  - Expanded connectivity options (CAN, MOST, USB, dual displays, SDIO
  - Connectors for Processor Module and Wireless Modules

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SABRE Platform for Tablets Key Features

i.MX53 1GHz Cortex-A8

Other Freescale silicon

- SGTL5000 Audio Codec
- MMA8451Q 3-Axis Accelerometer
- MAG3110 Magnetic Sensor
- MC1323X ZigBee®

Memory

- 1GB DDR3
- 16GB SanDisk SSD
- 8GB eMMC

PMIC: Dialog DA9053

Connectivity

- Atheros GM22 GPS Receiver
- Atheros AR6003 Wi-Fi + AR3001 BT Module

User Interface

- 10.1” 1024x768 display with capacitive multi-touch
- Omnivision OV5642 5MP camera
- Capacitive Buttons: Home, Menu, Back, Search
- Other Buttons: Power, Reset, Volume up/down

I/Os:

- HDMI connector
- 1x Full size SD Card Slot
- 2x High-Speed USB Host, 1 x Micro-USB
- 1x SATA port, 1x LVDS display footprint
- Debug PCB with Ethernet 10/100, JTAG, UART
- Stereo Speaker, Headphone/Microphone

OS Support

- Android, Ubuntu, Linux, Windows Embedded

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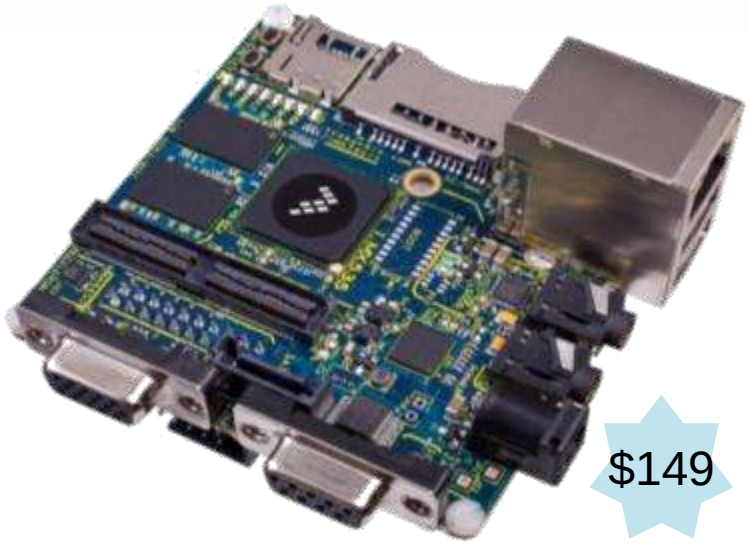
i.MX53 Quick Start Board Key Features

i.MX53 1Ghz Cortex-A8 Processor
- Dialog DA9053 PMIC
- 1 GB DDR3 memory
- 3” x 3” 8-layer PCB

Display
- LVDS connector
- VGA connector
- Parallel LCD add-on card via expansion connector
- 24 bit 4.3” 800x480 WVGA with 4-wire touch screen
- HDMI add-on card via expansion connector

Audio
- SPDIF output via HDMI add-on card
- Freescale SGTL5000 audio codec
- Microphone and headphone jacks

Expansion Connector
- Enables parallel LCD or HDMI output
- Camera CSI port signals
- I2C, SSI, SPI signals



Tools Support
- Segger/CodeSourcery, Macgraigor, IAR debug/IDE tool chain
- Inflexion™ UI from Mentor Embedded
- VMware player to bring up image on a Windows PC

Connectivity
- Full-size SD/MMC card slot
- Micro SD card slot
- 7-pin SATA data connector
- 10/100BT Ethernet port
- 2x high-speed USB host port
- 1x micro USB device port

Debug
- JTAG connector
- DB-9 UART port

Additional Features
- 3-axis Freescale accelerometer (MMA8450QT)
- Power supply 5V, 2A

OS Support
- Linux from Freescale; Android 2.2 and Windows Compact 7 from Adeneo

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i.MX 6 Reference Designs (with Production Silicon)

- All Boards FSL designed
- All Boards FSL supported
- Common set of boards for 6Q/D/DL/S
- SoloLite will have its own EVK

	i.MX 6Quad • Dual DDR	i.MX 6Dual • Dual DDR	i.MX 6Dual Lite • Dual DDR	i.MX 6Solo • Single DDR • EPD	i.MX 6SoloLite • Single DDR • EPD
SABRE–AI for Auto ($1499)	✓			✓	
SABRE Platform for Smart Devices ($999)	✓		✓		
SABRE Board for Smart Devices ($399)	✓				
i.MX 6SLEVK ($599)					✓

i.MX 6 maximizes use of reference boards across derivative parts

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Freescale i.MX 6 Series Development Systems

SABRE Board for Smart Devices

P/N: MCIMX6Q-SDB

- **Cost-effective ($399)**, open source development platform
- Designed to **simplify product evaluation**

SABRE Platform for Smart Devices

P/N: MCIMX6Q-SDP
MCIMX6DL-SDP

- Smart Device Market-focused
- Form-factor ready to accelerate design & time to market ($999)

SABRE Platform for Automotive Infotainment

P/N: MCIMXABASEV1
MCIMX6SAICPU1
MCIMX6QAICPU1

- Automotive Market-focused
- Standard base board ($699) and adaptable CPU card ($799) system

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i.MX 6Quad/6Dual/6DualLite Reference Designs

SABRE Board for Smart Devices

- Cost-effective ($399), open source development platform
- Designed to simplify product evaluation

SABRE Platform for Smart Devices

- Smart Device Market-focused ($999)
- Form-factor ready to accelerate design and time to market

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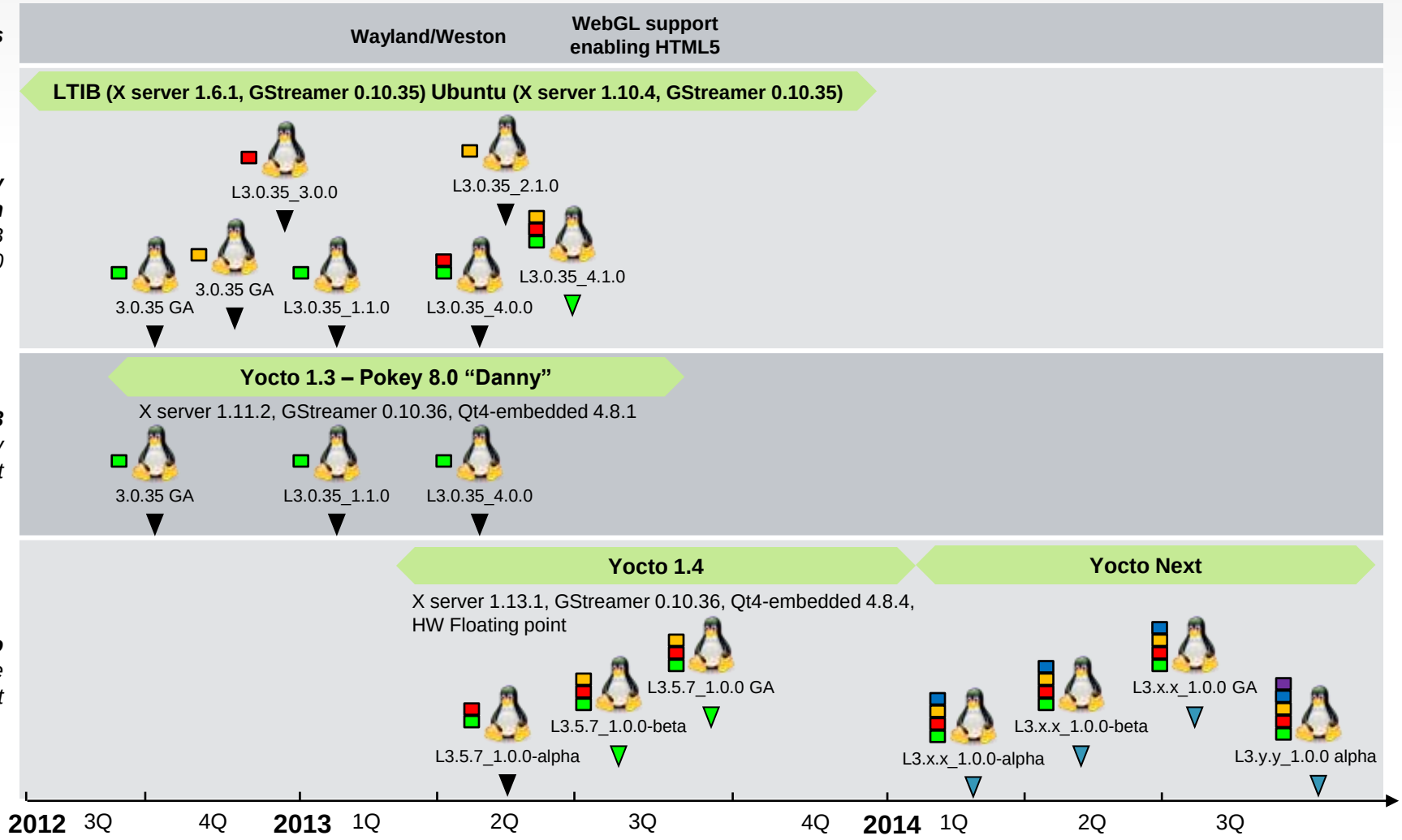
Yocto Roadmap



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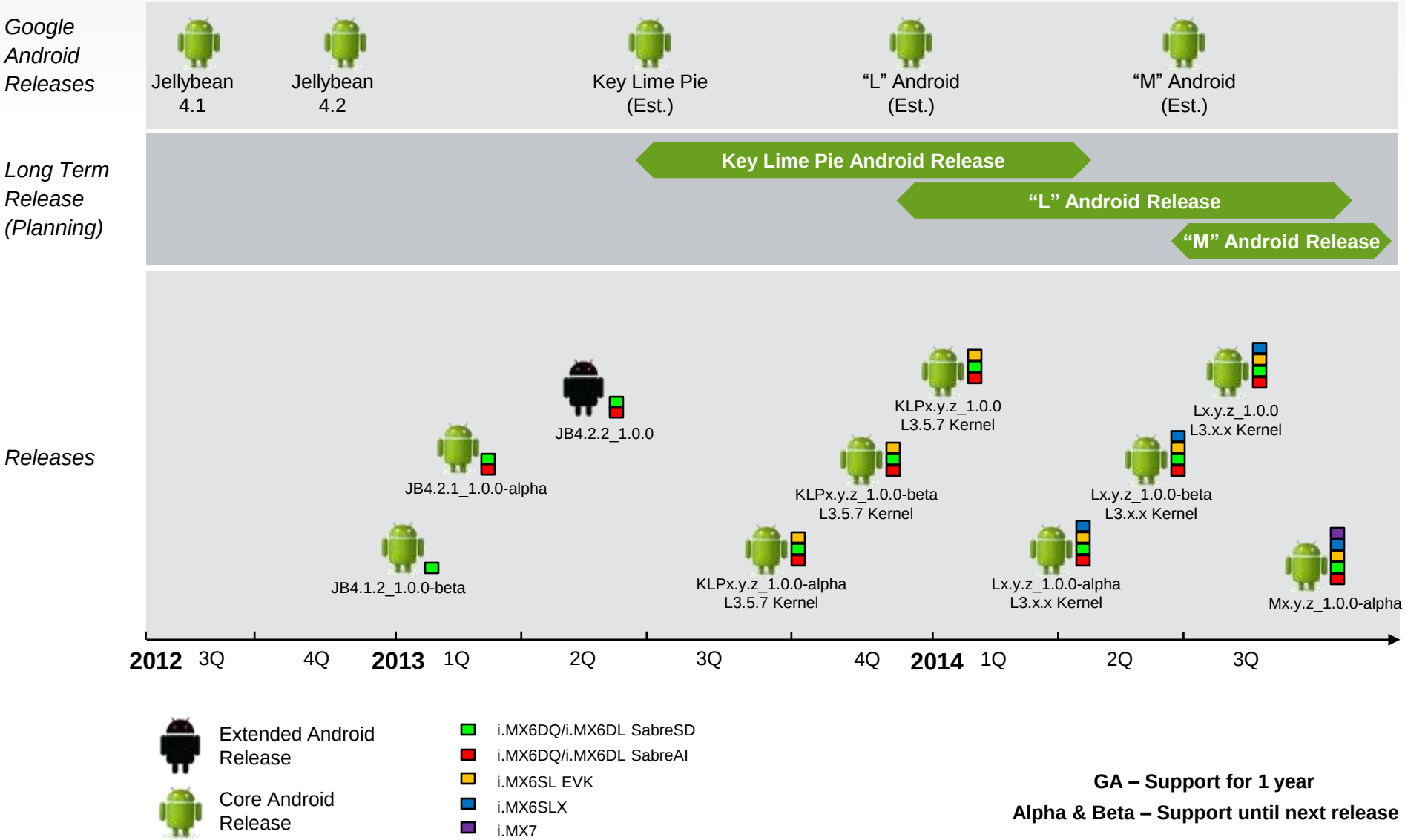
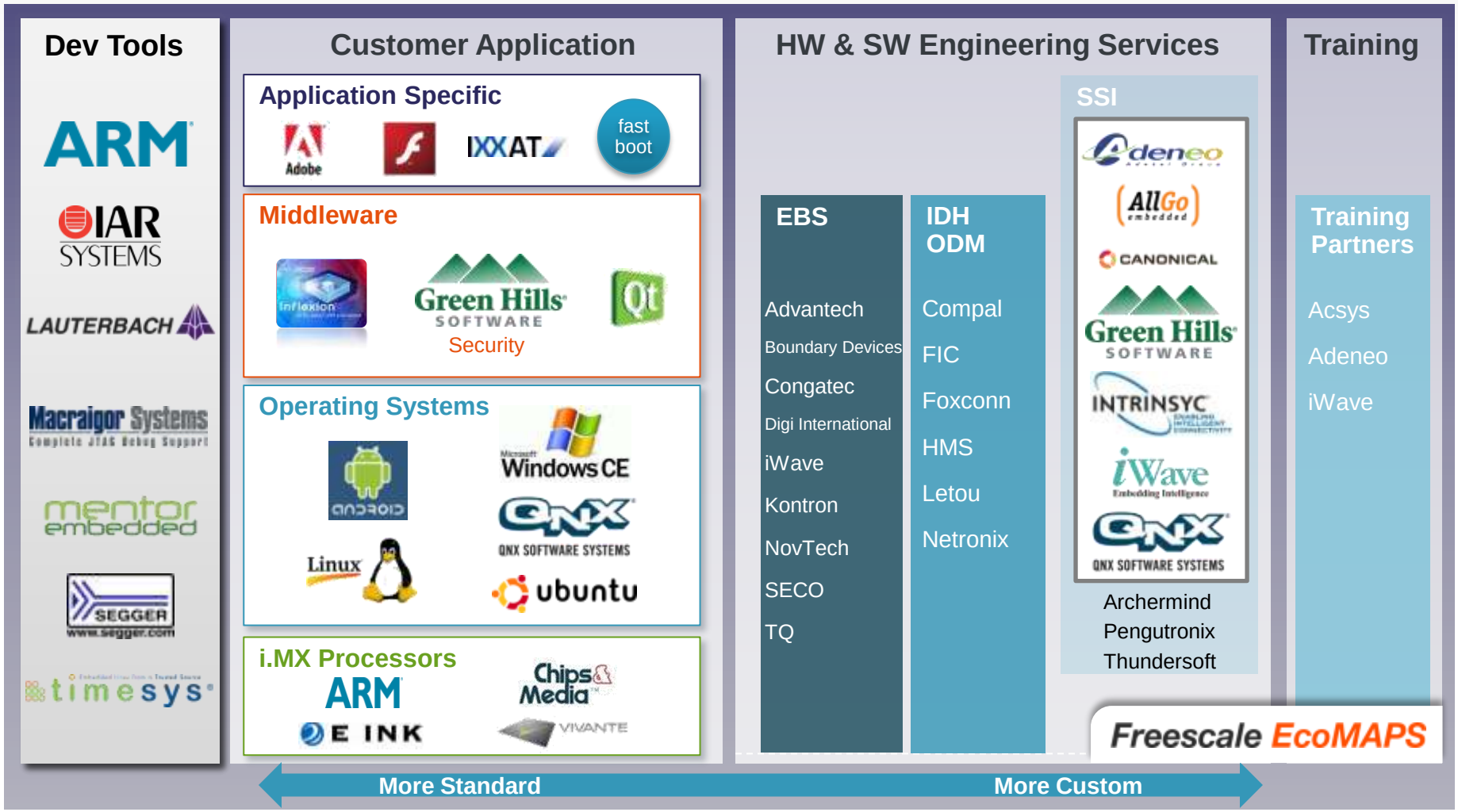
Android Roadmap



Freescale EcoMAPS for i.MX Architectures



IDE: Integrated Development Environment
BDM: Background Debug Module

EBS: Embedded Board Solutions

IDH: Independent Design House
ODM Original Design Manufacturer

SSI: Software & Solution Integrators

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www.imxcommunity.org

A Freescale supported open web community of developers sharing common interest in transforming i.MX applications processors into practically anything imaginable.

Community Facts at a Glance

- Over 3,000 members and over 200 Freescale engineers and marketers interacting with you
- Support and enablement for i.MX processors and software
- Forums, Groups and Blogs Posts
- News, Photos and Videos
- Training, Events and Promotions

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